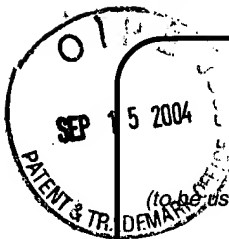


Please type a plus sign (+) inside this box → ☐

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/413,036
Filing Date	October 6, 1999
Inventor(s)	Asif Dawoodi GANDHI et al.
Group Art Unit	2681
Examiner Name	Temica M. Davis
Attorney Docket Number	29250-000344/US

ENCLOSURES (check all that apply)

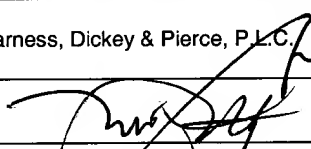
<input checked="" type="checkbox"/> Fee Transmittal Form <input checked="" type="checkbox"/> Fee Attached <input checked="" type="checkbox"/> Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Assignment Papers (for an Application) <input type="checkbox"/> Letter to the Official Draftsperson and _____ Sheets of Formal Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____	<input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> LETTER SUBMITTING APPEAL BRIEF AND APPEAL BRIEF (w/clean version of pending claims) <input type="checkbox"/> Appeal Communication to Group (Notice of Appeal, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): Declaration Under 37 C.F.R. § 1.131 Exhibit A (Attachment)		
<table border="1"> <tr> <td>Remarks</td> <td></td> </tr> </table>			Remarks	
Remarks				

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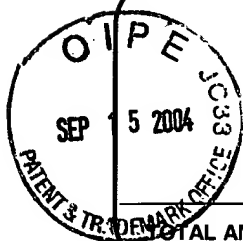
SEP 17 2004

Technology Center 2600

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name	Gary D. Yacura	Reg. No.	35,416
Signature	 45,274				
Date	September 15, 2004				

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FEE TRANSMITTAL for FY 2003

Patent fees are subject to annual revision.

Complete if Known

Application Number 09/413,036
 Filing Date October 6, 1999
 Inventor(s) Asif Dawoodi GANDHI et al.
 Examiner Name Temica M. Davis
 Group Art Unit 2681
 Attorney Docket No. 29250-000344/US

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SEP 17 2004

Technology Center 2600

TOTAL AMOUNT OF PAYMENT (\$ 420.00

METHOD OF PAYMENT (check one)

1. ☒ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to:

Deposit
Account
Number

08-0750

Deposit
Account
Name

Harness, Dickey & Pierce, P.L.C.

- ☒ Charge Any Additional Fee Required
 Under 37 CFR 1.16 and 1.17
☐ Applicant claims small entity status.
 See 37 CFR 1.27

2. ☒ Payment Enclosed:

☒ Check ☐ Credit card ☐ Money
 Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Fee Code	Entity Fee (\$)	Small Fee Code	Entity Fee (\$)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1)

(\$ 0

2. EXTRA CLAIM FEES

Total Claims	Entity	Small	Entity	Extra Claims	Fee from below	Fee Paid
50	-50 **			X		
Independent Claims	4	-4 **		X		
Multiple Dependent				X		

Large Fee Code	Entity Fee (\$)	Small Fee Code	Entity Fee (\$)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2)

(\$)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

Large Entity Fee Code	Large Entity Fee (\$)	Small Entity Fee Code	Small Entity Fee (\$)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
1053	1053	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	420	2252	210	Extension for reply within second month	420.00
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17 (q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR § 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3)

(\$ 420.00

SUBMITTED BY

Complete (if applicable)

Name (Print/Type)	Gary D. Yacura	Registration No. Attorney/Agent)	35,416	Telephone	703-668-8000
Signature	45,274			Date	September 15, 2004

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.



Lucent Technologies
Bell Labs Innovations



Intellectual Property-Law

Subject: IDS No. 117949
Method For Controlling Reverse Link Interference
Rise And Power Control Instability In A CDMA System

Date: March 1, 1999
From: Jimmy Goo
IP-Law
WH 6B-105
(973) 386-6377

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SEP 17 2004

T. Bursh:
J. P. Marione:
D. Poticny:

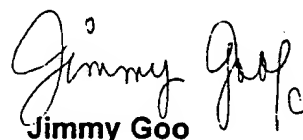
Technology Center 2600

A patentability item has been opened to consider the material submitted by Asif D. Gandhi, Marc B. Ibanez, Lei Song, Mathew Thomas, and Stanislav vitebskiy.

It has been given Submission No. 117949 and is entitled "Method For Controlling Reverse Link Interference Rise And Power Control Instability In A CDMA System."

Please notify me of any changes in either the technical or commercial aspects of the disclosure.

It is also important that my attention be directed to any relevant work by others, either in or out of the Lucent family, as well as to any Lucent or non-Lucent product which may utilize this subject matter.


Jimmy Goo

Copy to
A. D. Gandhi
M. B. Ibanez
E. Pittampalli
L. Song
M. Thomas
S. Vitebskiy
File Copy

SUBMISSION NO. : 117949

ATTORNEY : Goo, Jimmy

Title :

Method For Controlling Reverse Link Interference
Rise And Power Control Instability In A CDMA System

-----MAIN INFORMATION-----

ITEM STATUS	: Opened	LUCENT RATING	:
STATUS DATE	: 02/26/1999	PATENT WPN	: U0
OPEN DATE	: 02/01/1999	GOVT. CONTRACT	: No
CLOSE DATE	:	TYPE	: Patentability
DEADLINE DATE	:	DEFENSIVE	: No
BU CODE(S)	: WAMP,WCTS		

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DIRECTOR : J. Marione

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DIRECTOR : David Poticny

SUBMITTER NAME : Vitebskiy, Stanislav
COMPANY : LUCENT
LOC_EXT : NJ0117 16935
DEPARTMENT : JW45C1000
DIRECTOR : J. P. Marione

Brief Description :

No data in this field

Jimmy
H
OC

○ Title of Invention:

Method for controlling reverse link interference rise and power control instability in a CDMA system

○ Name of Inventors, telephone, address, and business unit:

Asil D. Gandhi,	WH 4C-239B,	973 386 2697,	WAMP JW45C1000
Marc B. Ibanez,	WH 1D-308B,	973 386 5149,	WCTS JW83BD000
Lei Song,	WH 3A-367,	973 581 6835,	WCTS JW83BD000
Mathew Thomas,	WH 1D-306A,	973 581 6824,	WCTS JW83BA000
Stanislav Vitebskiy,	WH 4C-253,	973 581 6935,	WAMP JW45C1000

○ Name of principal person to work with attorney:

Mathew Thomas, WH 1D-306A, 973 581 6824, WCTS JW83BA000

○ What problem does the invention solve or what purpose does it serve ?

This invention provides a solution for mitigating potential reverse link power control instability during periods of reverse link overload / interference rise. Power control instability could also be triggered by mobiles having an incorrect implementation of the standard, and this new technique mitigates these effects while maintaining system performance. We also note that such interference rise has been observed in field data.

For all CDMA system architectures (Series II, Flexent, and 3G from a Lucent perspective); interference at the base station increases with reverse link loading. The current Reverse Inner Loop Power Control (RILPC) algorithm reacts to this condition by issuing transmit power up-adjust commands as necessary. In certain cases, the system may get into an unstable mode of operation. For example, under heavy loading, if a sufficient fraction of mobiles power up, it increases the interference to other mobiles appreciably and forces them also to power up. In turn, this increases the net interference further and leads to a "runaway" situation that is damaging from a service perspective. The goal of this invention is to detect, manage, and correct such a situation.

Sharp increases in received interference may also occur due to mobiles with incorrect implementations of the standard. Such mobile violators are difficult to detect, though the system has to operate in a robust manner under such conditions also. The proposed method protects the system from these operational conditions to a certain extent and mitigates the impact of such violators on system performance.

Any significant increase in interference results in a corresponding coverage reduction, since distant mobiles would lack the necessary transmit power headroom to overcome this interference rise. Such calls could also be dropped if the situation persists long enough. Since this technique directly controls the interference rise, it would improve or maintain reverse link coverage as well as overall service quality.

Currently this problem is not addressed at the RILPC level as it is specified to work on a per user basis without considering the overall system performance impact.

○ Explain your solution. Attach any sketches, lab notebook entries, TMs, etc. which help describe and illustrate the solution.

The solution modifies RILPC operation during periods of reverse link overload or high received interference.

Under overload / high interference conditions, the new RILPC takes into account the impact of increased received power from all users before issuing power up-adjust commands, while under normal conditions, the existing procedure is still utilized. The proposed solution involves three separate aspects of system operation.

1. Detection of the onset of increased interference from various causes to trigger the modified RILPC algorithm.

Several approaches are being considered for this, the primary one being increase in average Received Signal Strength Indicator (RSSI) over a specified threshold.

Another approach is to use the ratio of power up-adjust commands to power down-adjust commands at any given time, in conjunction with the current RSSI data and number of users.

A third approach is to monitor any significant EbNo reduction for a large fraction of active users over a specified period of time.

2. The modified RILPC algorithm itself that issue power up-adjusts based on overall system state rather than on individual user state.

One of the approaches being considered for this aspect is to issue up-adjust requests in a probabilistic manner. While operating in an unstable reverse link scenario, issuing up-adjusts to all users who do not meet the normal EbNo target moves the system further into the unstable region. To prevent this, once the condition is detected, a fraction of the up-adjusts which are normally issued are converted into down-adjusts probabilistically, and this forces some mobiles to power down and reduce the interference. If the situation persists, the fraction of up-adjusts being converted to power down requests is adjusted using an exponential backoff algorithm. This process also leads to a transient loss in reverse link quality, but improves the stability in that the unchecked increase in interference is contained and thus overall quality is improved.

Another similar approach is to lower the EbNo target for all users under such conditions and also modify the range over which the target set-point is allowed to vary than under normal operating conditions. Here also a smaller fraction of the users require up-adjusts (under the new EbNo targets and set-point range) and this serves to contain the increase in interference.

3. Detection of interference reduction and reverting back to normal RILPC operation.

Here too the RSSI behavior is the primary trigger for detecting this condition. The ratio of up-adjust and down-adjust commands coupled with received EbNo for active users is another factor in this decision.

- © Under what circumstances will it be economically advantageous to someone outside of Lucent to make, use or sell the invention?

Any CDMA system (IS95A(B), WCDMA, CDMA2000, or other 3G system) would benefit from this approach as it enables the system to operate more gracefully under increased reverse link interference. Since these conditions may occur from a variety of causes, such an approach would become an integral part of reverse link power control, and thus be valuable to all CDMA infrastructure manufacturers. If it were included into a future standard, any compliant implementation would need our licensing.

- © How easily could Lucent detect, or suspect, that someone was making, using or selling the invention?

With some effort by means of collecting power control data under overload / high interference conditions and analyzing patterns of RILPC commands.

- © How easily can the invention be designed around? In other words, how easily can another designer achieve the same functionality with a different design and for roughly the same costs?

From an idealized theoretical point of view, a comparable approach uses the propagation loss to each user (very difficult practically) to solve for the transmit powers required by each mobile. This solution is subject to the constraints of tolerable interference rise at base station, signal quality and transmit power limitations of mobiles and is computationally prohibitive within the time scale of operational interest (RILPC works at 1.25ms resolution). Hence in any practical scenario, it is our belief that the proposed solution (or variations thereof) is the only feasible approach.

Dec. 23, 1998

Det. Sacka / 1-4-99
Dept. Head of Principal Inventor / Date

FP / JAM 1-5-99
John A. Marinho, Technology Director / Date